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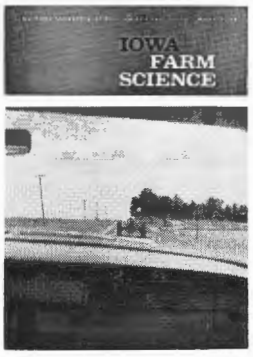

"Protect yourself! Necessary though it may be, you're in danger every time you drive a farm tractor on the highway," says farm safety specialist Norval Wardle. But he offers some suggestions for safety devices and practices in his article beginning on page 10 of this issue.

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FS-913 Tractors + Traffic = Trouble
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chat with the editors

MORE "YOUR ESTATE" ARTICLES

Interest seems to be unusually high in the "Your Estate" series of articles that has been appearing in Iowa Farm Science. Another article appears in this issue.

We're now being asked both by letter and telephone if we've yet published all of the series or if there are still more articles to come. The answer is that there are two more articles in the series. Articles published so far, by reprint number and date of issue, include:

FS-895 How Estates Are Settled (Jan.)

FS-897 If You HAVE a Will (Feb.)

FS-898 If You DON'T Have a Will (Feb.)

FS-905 What Taxes and How Much? (March)

FS-909 What Costs for Settlement? (Apr.)

FS-912 Saving Taxes by Planning (May)

The last two articles, not yet definitely scheduled, will appear in the June and July or the July and August issues, depending on final schedules. One of these will deal with the means and specific methods available for transferring property. The final article in the series will outline the kinds of rights of ownership in property -- real and personal -- that form the base for sound planning of an estate or other property transfers.

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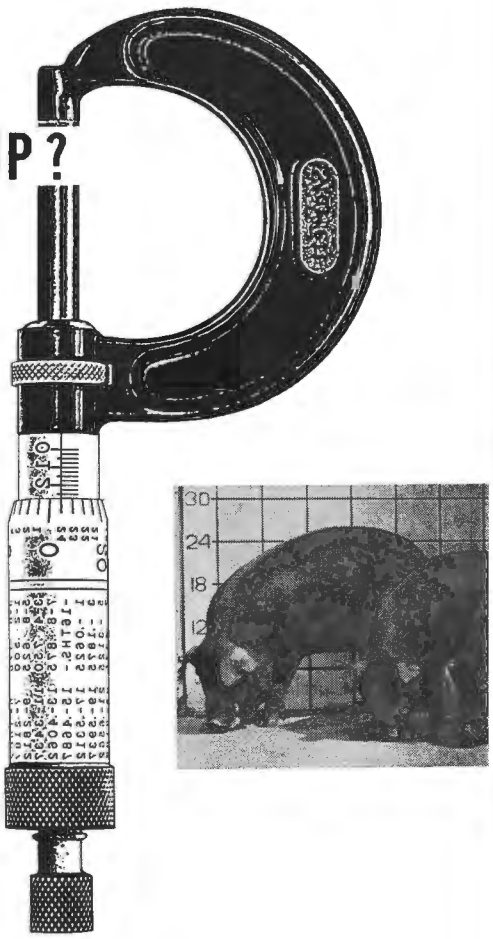
HOW WELL DO YOUR PIGS MEASURE UP?

The average performance of your herd is what determines the efficiency of your swine program. Here are some guides developed at Iowa State that can help you follow and possibly improve the progress of your herd.

by Virgil W. Hays



DO YOUR PIGS go to market at an average age of 146 days on less than 3 pounds of feed per pound of gain? If they don't, this review of feeding trials at Iowa State may give you some ideas on how to improve your swine program. The important word here is *program*—since it's your *feeding* and *management* program, not an individual feed, that determines the efficiency of your swine operation.

What We Did . . .

In our program, 324 pigs were weaned at an average age of 20 days and an average of 12 pounds body weight. (These are averages for the group. Individual ages ranged from 15 to 26 days, and weights ranged from 7.8 to 19.4 pounds.) These pigs were reared in confinement. The pigs were farrowed in three groups—one in the spring, two in the fall. Thus, they were exposed to a wide range of temperature environment, including the extreme cold weather of the winter and extreme high temperatures of the summer.

After weaning, the pigs were placed on a starter ration and were fed this diet for 6 weeks. After the starter phase, pigs were fed the grower diet for the next 6 weeks and then fed the finisher ration until they reached market weight. On this feeding program, the pigs averaged 200 pounds at 146 days of age. Of course, not all pigs grow at the same rate. So we topped the pigs out when they reached the desired market weight. Pigs started coming off these tests at 200 pounds body weight at 130 days of age.

Rations Used . . .

We used three different rations (table 1) for these pigs during the period from 20 days of age to market weight. We called these the "starter," "grower" and "finisher" rations. They're formu-

TABLE 1. Make-up and Calculated Analysis of Starter, Grower and Finisher Rations.

	Rations		
	Starter	Grower	Finisher
Ingredient:			
Ground yellow corn	56.20%	81.9%	86.6%
Dried whey (70% lactose)	15.00	—	—
Solv. soybean meal (50% protein)	22.00	13.5	8.7
Stabilized lard	2.00	—	—
Calcium carbonate	0.80	0.8	0.8
Dicalcium phosphate	0.85	1.2	1.3
Iodized salt	0.50	0.5	0.5
Trace mineral mix	0.15	0.1	0.1
Vit.-antibiotic premix (corn carrier)	2.00	2.0	2.0
TOTALS	100.00	100.0	100.0
Calculated analysis:			
Protein, %	18.0	14.0	12.0
Calcium, %	0.80	0.65	0.65
Phosphorus, %	0.55	0.50	0.50
Vitamin A, I.U./lb.	3,580	1,830	1,885
Vitamin D_2, I.U./lb.	500	300	300
Riboflavin, mg./lb.	4.0	2.0	2.0
Pantothenic acid, mg./lb.	8.0	5.0	5.0
Niacin, mg./lb.	25.0	15.0	15.0
Choline, mg./lb.	544	343	290
Vitamin B_{12}, mcg./lb.	20.0	10.0	5.0
Antibiotic, mg./lb.	50.0	10.0	10.0

VIRGIL W. HAYS is assistant professor of animal husbandry.

lated to meet the average needs of the pigs for the particular phase of growth involved. The starter and grower rations were fed for 6 weeks. At the end of the starter phase, the pigs averaged 46 pounds body weight. At the end of the grower phase, they averaged 117 pounds. The finisher ration was used to finish the pigs out to market weight. This took an average of 6 weeks.

These three rations differ mainly in the level of protein and amount of vitamin and antibiotic fortification. A young pig grows at a faster rate and, therefore, has higher nutrient needs than an older pig. This more rapid rate of growth is shown in chart 1. Notice that the 30-pound pig gains at the rate of 1 pound a day—or increases his body weight by 3⅓ percent a day. By the time the

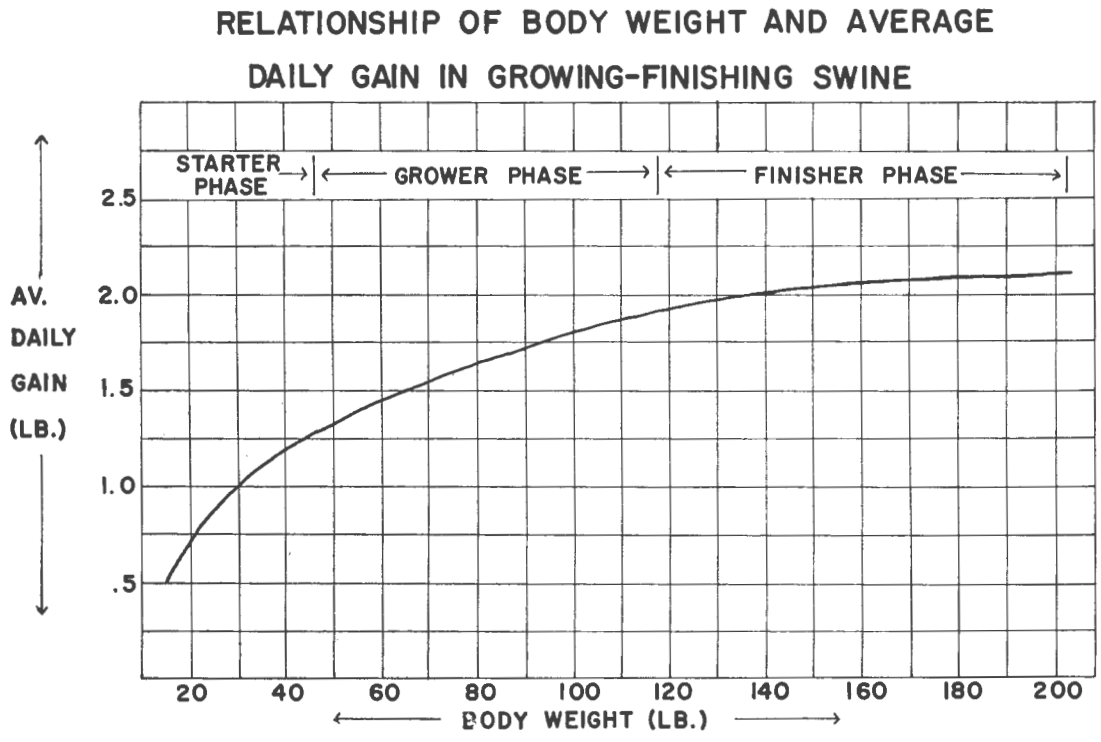


Chart 1.

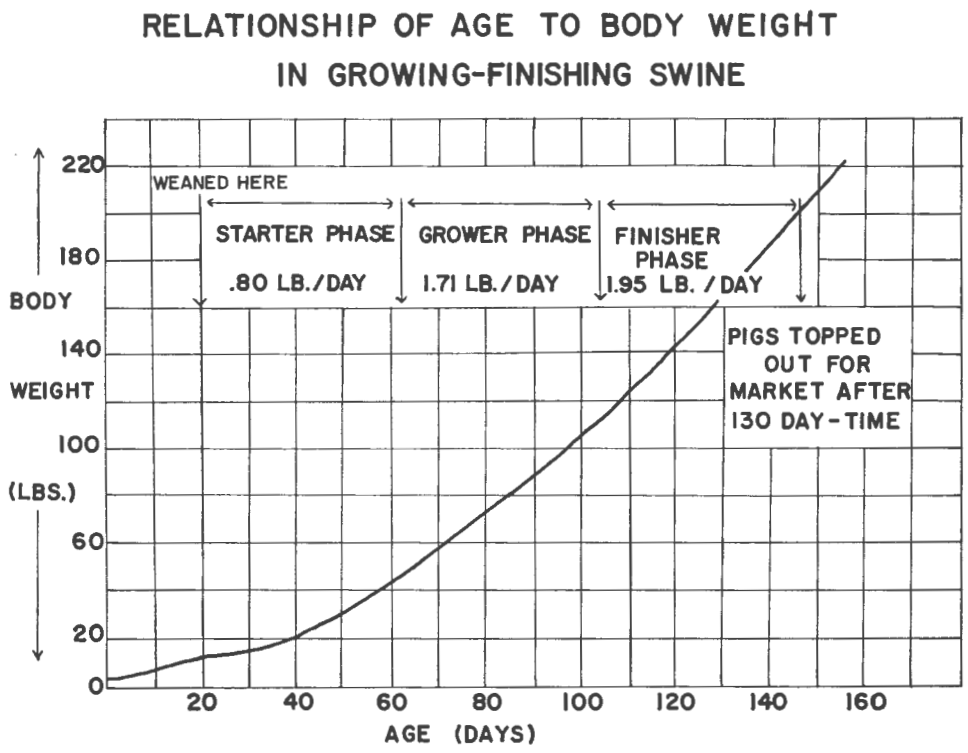


Chart 2.

pig reaches 140 pounds, the increase in body weight per day is less than 1½ percent. Also, during his early growth, the pig lays down more lean tissue in proportion to fat, and this calls for more protein in the feed.

These changes in the relative rate of growth and the type of tissue being produced result in a gradual change in the nutritive needs of the pig as he grows from the infant stage to the mature animal. For simplicity we divided this period of the pig's life cycle into three phases and provided him with his average needs for each of these three phases. Actually, we could develop a feeding program which would more nearly approach the pig's nutritive requirements if we used four or five feeds instead of only three.

The important thing is that the

RELATIONSHIP OF FEED INTAKE TO BODY WEIGHT IN GROWING-FINISHING SWINE

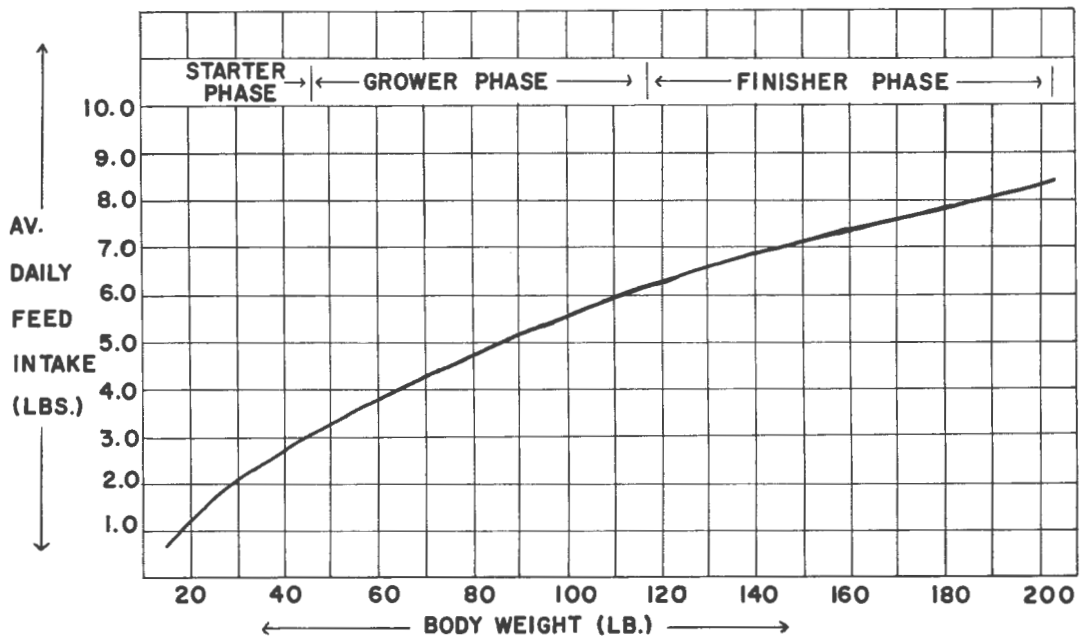


Chart 3.

RELATIONSHIP OF FEED REQUIRED PER POUND OF GAIN AND BODY WEIGHT IN GROWING-FINISHING SWINE

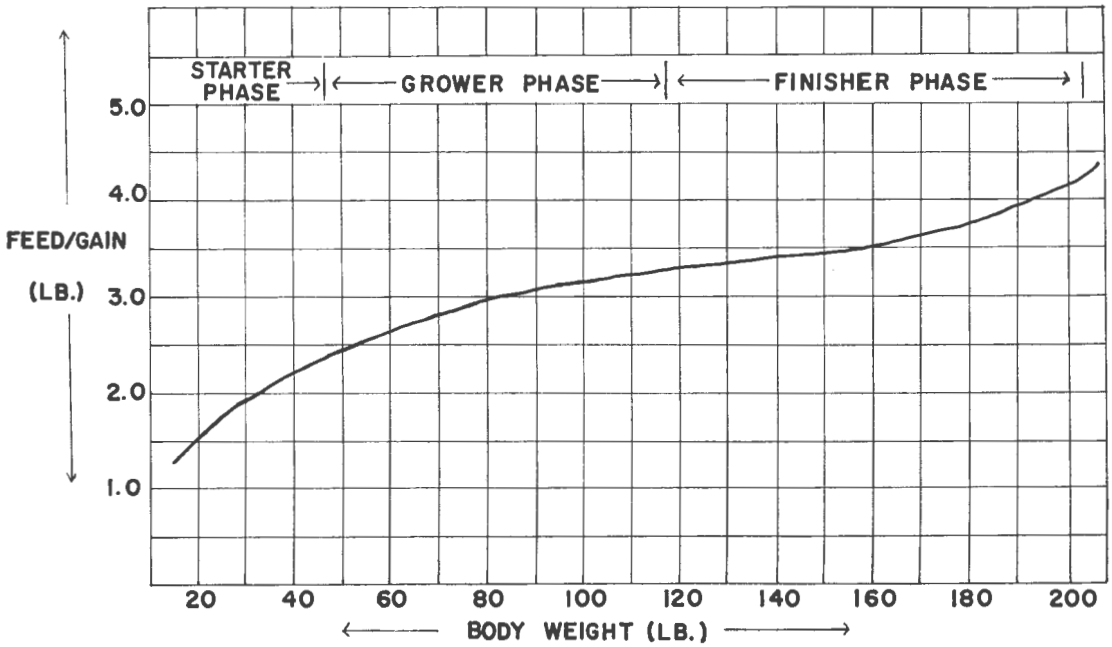


Chart 4.

ration be formulated for a given stage in the life cycle of a pig. A ration that's adequate for the starter phase of the pig's growth won't give economical performance if fed during the grower-finisher period. Likewise, a ration formulated for the finishing stage of the pig's life will not result in satisfactory performance if fed to young, rapidly growing pigs.

Rate of Growth . . .

Chart 2 shows the average growth curve of these pigs. After weaning there was a temporary lag in growth rate while the pigs adapted to a dry diet. This temporary lag lasted about a week. These pigs didn't have access to a creep ration before weaning; also, the starter diet was a simple one. (If you prefer, this lag following weaning can be partly overcome by providing a high-milk, pre-starter diet immediately after weaning. But the lag period isn't a serious one; the pigs in our tests averaged 40 pounds of weight at 56 days of age and, at this age, were gaining at the rate of 1.2 pounds a day on an economical ration.)

During the 6-week "grower" phase (62-104 days), the pigs grew at an average rate of 1.71 pounds per day and required an average of 2.9 pounds of feed per pound of gain.

During the final phase of growth, pigs grew at a rate of 1.95 pounds per day and required an average of 3.58 pounds of feed per pound of gain. In this final period, the pigs were fed the finisher ration shown in table 1.

Over the three feeding periods (20-146 days) the pigs grew at an average rate of 1.49 pounds per day on 3 pounds of feed per pound of gain.

Check Your Pigs . . .

You can use chart 2 as a guide to how well your pigs should be gaining. For example, a pen of pigs averaging 85 days of age should average about 80 pounds body weight. If you want to check the rate of gain of your pigs, weigh several pigs and weigh them again 10 days to 2 weeks later. Then check the results against the chart. For example, the pigs in our tests (see chart) averaged 73 pounds at 80 days of age. At 90 days, they averaged 89 pounds. They gained 16 pounds in 10 days or 1.6 pounds per day. This represents the average for the 324 head. The better-doing pigs in the group, of course, were heavier at this age and gaining at a faster rate.

When checking pigs for rate of gain, it's important that you leave at least 10 days between times of weighing. Two weeks or more would be better, because the fill of the animal can greatly influence its change in weight for a shorter period of time.

How Much Feed?

As the animal gets heavier, he eats less feed in proportion to his total weight—though he eats more pounds of feed per day (chart 3). So the percentage of feed needed for maintenance is increased. This leaves less nutrients for gain in body weight. Also, as the pig gets heavier he lays down more fat tissue in proportion to lean. This takes more feed per unit of gain.

You can use chart 3 to estimate how much feed you'll need to carry your pigs for a given time. For example, suppose that your pigs average 180 pounds and you want to estimate how much feed they will need for another 10 days. Look at the chart. You'll see that they'll need about 7.9 pounds of feed a day. Multiply by 10 days, and your answer will be 79 pounds of feed for each pig for a 10-day period.

Looking at chart 4, notice that the amount of feed required per pound of gain increases faster as the pig approaches 200 pounds. This is an incentive to top pigs out for market at 200-220 pounds, especially if the price of feed is high relative to the selling price of hogs —that is, as the corn-hog ratio becomes unfavorable.

The estimated total feed needed for each growth stage is given in table 2. A total of 563 pounds of feed was required to feed a pig from about 12 pounds to a market weight of 200 pounds. The pigs required an average of 60, 206 and 297 pounds of feed per head for the starter phase, grower phase and finisher phase, respectively. The average of the ages of all the pigs at market weight was 146 days.

You may have individual pigs that reach market weight at less than 130 days of age—the youngest market age in these trials. But the *average* performance of your herd determines your profits or losses. This average performance should be your yardstick. Accurate records on amounts and costs of feed fed and on the weights and selling prices of the hogs marketed can help considerably when you evaluate the efficiency of your swine program.

Also, though we've concentrated on the *feeding* program in this article, careful selection of breeding stock and careful planning for disease control are highly important in any good swine program.

TABLE 2. Summary of Performance of Growing-Finishing Pigs.

	Starter period	Grower period	Finisher period
Av. No. days in period	42	42	42
Av. initial weight, lb.	12	46	117
Av. final weight, lb.	46	117	200
Av. total gain, lb.	34	71	83
Av. daily gain, lb.	0.80	1.71	1.95
Total feed required, lb.	60	206	297
Av. feed/gain, lb.	1.76	2.90	3.58

Saving Taxes by Planning

While tax savings alone should never be the only basis for a careful plan, here are some points of tax law and some of the tax-saving principles that may be helpful to you in planning for your estate and property distribution.

by John C. O'Byrne and John F. Timmons

TAX SAVING is legitimate and proper. You always have the right to arrange your affairs to obtain the benefit of all special tax provisions and to minimize taxes honestly. This applies both to income taxes and to estate or property transfer taxes.

As a property owner, you have a duty to your government to bear your proper share of taxes, but you're also responsible to your family and heirs to pay no more than is due. Thus, tax aspects become important considerations in planning your estate.

Each estate represents a problem peculiar to a particular family and the property involved. We suggest, therefore, that you obtain specific legal advice to fit the exact circumstances. We can in this article, however, point out the general lines of tax planning and tax saving that are available. (See also, "What Taxes and How Much?" in the March issue or reprint FS-905.)

Federal Estate Tax Planning: Possible methods, or some combination or variation of them, for saving federal estate taxes include the following.

- *Use of lifetime gifts* to reduce the amount of property owned at death. Taxes on lifetime gifts usually are less than federal estate taxes on gifts at death.

- *Use of the marital deduction* to transfer property to a surviving spouse free of estate tax; about half of a person's property can be left to his spouse tax free. The property that passes to the spouse will be taxed in his or her estate at death. But, under the estate tax system, the tax on property divided into two piles is less than the tax would be on the property in one lump. Also, each is entitled to the full exemption allowed at death. (Many people have wills that don't give the advantage of the marital deduction. Also, the settlement provisions of many insurance policies now held don't qualify for the marital deduction. It would be wise to have both wills and insurance policies re-examined for this purpose without delay.)

When discussing your estate and property transfer plans with your attorney, always weigh carefully your real desires and the circumstances of your family. A plan that simply saves taxes may not necessarily accomplish all of the things that you actually want.

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• *Use of a life estate* to one generation followed by a remainder in the next can result in granting the use of the property to one generation for life without a tax at the death of the life tenant. This "skips" the tax that would have been due if the property had been transferred outright to one generation and then transferred again to the next. (This method, however, won't permit the benefit of the marital deduction, so it's necessary to find and set up a plan that's most advantageous according to the circumstances.)

Sometimes a combination of these methods will work out. Half of the estate, for example, might go to the spouse outright to obtain the full benefit of the marital deduction, with the other half going to the spouse for life and then to the children. Often, this combination is achieved through the use of two trusts.

These three methods (or a combination of them) apply very generally in planning any estate for tax savings. Additional tax-saving ideas will be applicable to particular plans or estates. Essentially, tax planning is the prospective application of detailed tax laws to a particular family plan.

Iowa Inheritance Tax Planning: Methods of saving taxes vary under the inheritance tax. There's no marital deduction as in the federal estate tax. In some cases, inheritance tax savings go hand in hand with estate tax savings. In other cases, they differ or even conflict—making it necessary to consider the effects of both taxes on any plan. The major lines of inheritance tax saving, however, include the following.

• *Use of lifetime gifts* parallels the federal tax-saving principle. Iowa has no tax on lifetime gifts. A complete and outright gift made during life—without strings or reservations—removes that property from inheritance taxation.

• *Use of the life estate and remainder* often is a method of avoiding an additional Iowa tax. This works the same as for the federal tax but here, too, conflicts with the use of the marital deduction for federal taxes.

• *Use of insurance payable to a named beneficiary* rather than to the estate will save state inheritance taxes but *not* federal estate taxes. This is particularly important to smaller estates.

• *Use of exemptions and different rates* permitted to recipients of varying degrees of relationship can save state taxes. A father, for instance, might want to leave $40,000 worth of property to a son and his family. If he left half to the son and half to the son's wife, the son would have an exemption of $15,000 and be taxed at 1 percent on only $5,000. The daughter-in-law would have no exemption and be taxed at 5 percent on $20,000. But, if the bequest were made half to the son and half to his two children, only $15,000 would be taxed at 1 percent.

Examples . . .

Assume that a farm operator has a wife about 60 years of age and two sons, both over 21. He has an estate of $200,000 and expects to own about the same at death. The wife has no substantial property in her own name. He wants to leave all his property to his wife and sons, and the wife would leave whatever she had at death to the sons.

In planning this estate, the family and their lawyer would have to consider all of the possible contingencies—including the order of death of the family members and the ultimate beneficiaries such as daughters-in-law and grandchildren. For this example, however, assume that the farm owner will die first, leaving his wife and sons surviving. With these limited facts, there are several ways of achieving his purpose—but with different tax results.

Plan 1: If the owner willed the property to his wife for life and the remainder after her death to the two sons, he'd be allowed an exemption of $60,000 and owe a federal estate tax of $31,500. No marital deduction is allowed for the life estate to his wife. The Iowa inheritance tax—allowing an exemption of $40,000 to the widow and $15,000 to each son—would total $1,905. No tax would be due at the wife's death. The over-all tax cost on the transfer of the property from the father and mother to sons would be *$33,405.*

Plan 2: If he left all of the property to his wife outright, the marital deduction (disregarding debts, expenses, etc.) would be $100,000 and the exemption, $60,000—leaving a net estate of $40,000 on which a federal estate tax of $4,800 would be due. The state inheritance tax would be $5,962. However, when the wife died, leaving the property to the sons, her estate would be taxed. This time there'd be no marital deduction. Her federal estate tax would be $28,444, and the Iowa inheritance tax would be $3,532. Thus, the over-all tax cost would be *$42,738.*

Plan 3: If he combined the methods of plans 1 and 2, he might divide the estate into two parts—half passing outright to his wife to qualify for the marital deduction and half passing to the wife for life, remainder to the sons. The husband's federal estate tax would be $4,800; the Iowa inheritance tax, $3,415. At the wife's death, the federal tax would be $4,247; the state tax, $1,180. The over-all tax cost, in this case, would be *$13,642.*

Plan 4: If he divided the property, half to the wife outright and half to the sons outright, the wife's half would qualify for the marital deduction. The federal estate tax would still be $4,800, but the state tax would drop to $2,806. At the wife's death, with her estate left to the sons, the fed-

eral tax would be $4,520 and the state, $1,218. Here, the over-all tax cost would be *$13,344.*

Each of these four methods of distributing property to a wife and two sons provides for the wife for her life and ultimately places the total property in the hands of the sons. The over-all death tax costs for the different methods, however, ranged from a high of $42,738 to a low of $13,344. (Debts due and the costs and expenses of settling the estate have been disregarded in these examples, but the federal tax figures have been adjusted for credit for state taxes paid wherever allowable.)

There are many reasons for selecting one method of transferring property over another. A plan should never be selected solely for tax reasons without full consideration of specific family needs and characteristics. But the tax costs still are a matter of major concern. Even in the simple illustration just given of one small part of the planning process, decisions must be made on whether the over-all tax cost is to be about 7 percent of the total estate or more than 21 percent. Perhaps the real question is this: Are there compelling family reasons for the additional cost of $20,000 for Plan 1 or $30,000 for Plan 2 over Plan 3 or Plan 4?

Using tax-free gifts: Going on with the hypothetical example, it would be possible to reduce both income and inheritance and estate taxes further by means of planned gifts during life. During his lifetime, the husband and father could use the "split gift" provisions to transfer $72,000 worth of property to the sons free of tax in a single year. He'd use his $30,000 exemption, his wife's $30,000 exemption and four $3,000 exclusions since the transfer is treated as half given by the husband and half by the wife. Thereafter, $6,000 could be transferred to each son free of gift tax in each year.

Assuming now that the husband and father made a gift of $72,000, representing an undivided share of his farm, two lines of tax savings appear. The over-all family income tax may be reduced because the income from the sons' share of the property is taxed to them. Presumably, if the major asset was a farm and the sons received an interest in it by gift, father and sons would have formed a partnership to operate it. This would spread the income according to the land now owned by each and the amount of labor, machinery, livestock, etc. each contributed.

Consider also the tax results at death of the husband and father. He'd have an estate of $128,000 if he had given away $72,000. If he left half or more than half outright to his wife, the federal estate tax would amount to no more than $120. The tax would be zero if he had reduced his estate to $120,000 and qualified for the marital deduction. The federal tax at the wife's death would range from $116 to $10,800, depending on whether or not all property had gone to the wife or part to the wife and part to the sons. Iowa taxes at the wife's death, in leaving the property to her sons, would range from $480, if she had received half of the estate, to $2,150, if she had received all of it at her husband's death.

Thus, if the husband and father with an estate of $200,000 had given $72,000 to his sons during life and transferred by will at death half of the rest to his wife and half to his sons, the federal estate tax burden at death would be $120. When the wife left her half to the sons at her death, the estate tax then would be $116. The Iowa inheritance tax at his death would be $658; at her death, $476.

Considered planning—using the split gift, the marital deduction and the full Iowa exemptions—results in this situation in a total tax on both deaths of *$1,370.* Remember that, in our original example (Plan 1) seeking the same objectives in terms of property transfer, the total taxes on both deaths amounted to *$42,738!* Actually, the $1,370 total tax could have been further reduced by additional lifetime gifts to the sons by husband and wife. In fact, a sound plan would provide for reexamination after the husband's death to see how the wife should handle the property thereafter and whether she should then make gifts.

Effects of Income Taxes: Estate and inheritance taxes fall only upon death. The gift tax falls only in years when gifts are made. Income taxes, however, are an annual affair. This makes it important to include in any plan an analysis of the effects of income taxes on the family unit during the lives of all parties and upon the spouse, children and heirs following death of the husband and father.

We won't get into detailed consideration of the income tax aspects in this article. But be sure to discuss these with your attorney as your plans progress. Sometimes income tax considerations fall into line with other tax saving devices, and sometimes they're in conflict.

Plan Carefully . . .

In this article, we've listed some of the considerations of tax law and some of the tax-saving principles to be considered in planning the distribution of farm and other property. But tax savings alone should never be the sole basis of a careful plan. Always weigh carefully the desires and characteristics of the family against possible tax savings.

It may be that a plan that saves taxes doesn't accomplish a property owner's real desires. A sound plan must harmonize all of these. We've indicated some of the principles to think about. Work out the details, however, with the aid of a competent lawyer and tax adviser. Then re-examine the plan periodically in the light of changes either in the tax laws or in family situation.

Traffic+Tractors=Trouble

You're in danger each time you drive your tractor on the highway. Studies at Iowa State are helping to pinpoint some of the problems, their causes and possible solutions. Meanwhile, here are some tips for protecting yourself.

by Norval J. Wardle

"ALMOST like a sitting duck!" "Parked in a lane of traffic!" "Half blind and deaf!" Strong terms? Yes. But the facts bear them out. Necessary though it may be, you're in danger every time you drive a farm tractor onto the highway.

There were more than 3,000 accidents with farm tractors on Iowa roads from 1949 to 1959. There were 957 persons injured and 236 persons killed in these accidents.

This happened even though farm operators spend less than 5 percent of their tractor-operating time on public roads. The chances of having an accident with a tractor on the road are five times as great as in the field or yard. And, if there is an accident, the chances of its being fatal are over eight times as great on the highway as in the field or yard.

NORVAL J. WARDLE is associate professor of agricultural engineering.

The danger isn't confined only to major highways. More of these accidents occur on country roads than on the highways.

To help solve this critical problem, safety with tractors on the public roads has been under continuing study at Iowa State since 1955. Many road tests have been run to pinpoint the problems and their solutions. From these tests, certain practices have been appraised and adjusted for safety. And safety accessories have been developed and tested for their usefulness.

Out of this study and the road tests, the following suggested safety practices have been developed:

Protect Yourself . . .

If you must travel on a public road with your tractor, observe all traffic laws, including signals. Move onto the shoulder to let congested traffic pass, but never drive with one wheel on the paving and one off. Equip your tractor with helpful and worth-while safety accessories.

A rear-view mirror is a big help to the operator. With a rear-view mirror you don't have to turn around to check the traffic behind you. Turning around and looking back leads to erratic steering; the tractor may overturn or go into the ditch if you try to correct the direction too quickly when you again look forward and see where you're going. To be most effective, a rear-view mirror should be:

—At least 5 by 11 inches in size to give you a wide range of vision.

—Securely mounted to reduce mirror jiggling to a minimum. A tripod-type mounting has been most effective in our tests.

—Adjustable from side to side, up and down and forward and

back. Telescoping arms with universal-type mountings accomplish this. These adjustments make the mirror helpful in field and yard work as well as on the road.

—Easily replaceable should it break.

A red and white warning flag alerts other motorists so they have time to stop if necessary. Such a flag should be:

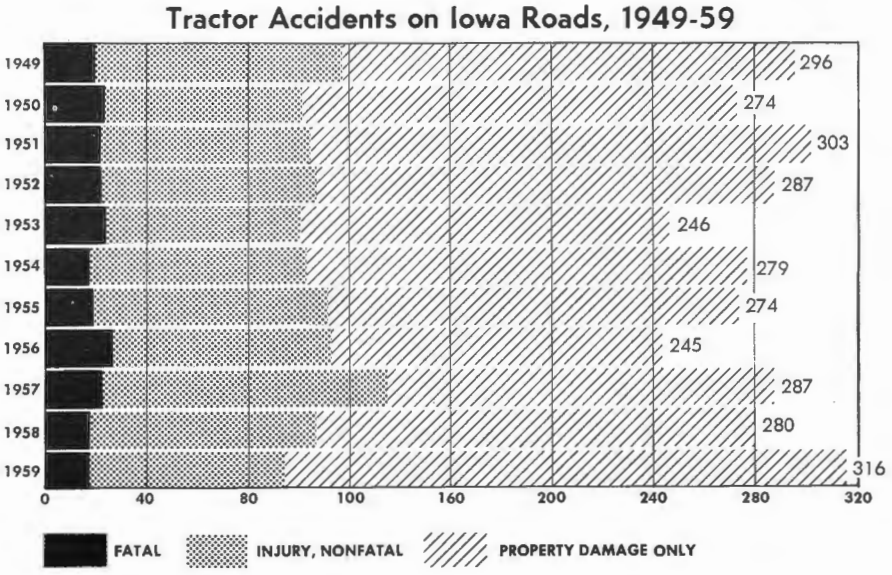
—At least 9 by 12 inches in size so it's readily seen at over 500 feet.

—Not over 16 by 20 inches in size. If the flag is too large, it doesn't wave easily in the breeze.

—Fastened to a staff by one edge. Then it will wave in the breeze and appear larger.

—Designed so that each color covers about half of the total surface. Single-color flags blend into much of the background. The best design is alternate red and white diagonal stripes about 3 inches wide (see photo, page 10). These are effective at 1,200 feet and more; stripes of less than 2½ inches are not easily seen over 300 feet away. Some checkerboard patterns also are easy to see (see cover photo).

—Mounted on a telescoping staff so that it can be lowered out of the way for field work—yet be handy to raise whenever you're going onto the road.



—Mounted not over 2 or 3 feet above the head of the operator or the top of the machine. This height gives a warning from at least 400 feet away on Iowa's steepest hill roads. If higher, the flag isn't related to the tractor.

—Mounted at any convenient place that doesn't interfere with tractor operation.

A large red tailight and two good headlights, each easily seen from 500 feet away, are needed for night travel.

Red reflective tape of 3 by 6 inches size on the rear of the tractor, wagon or machine helps to warn motorists of a slow-moving vehicle ahead.

It's best, of course, to stay off the road at dusk or dark, and most Iowa farmers do this. In the past 11 years, less than 2 percent of the accidents with tractors occurred at dusk or dark. In contrast, over 30 percent of the accidents involving all types of vehicles occur at dusk or dark in Iowa.

A rear-view mirror is an important safety device for on-the-road travel. With a mirror, you can determine the traffic situation behind you at a glance — avoiding the erratic steering resulting from the necessity of constantly having to turn around and look.

How They Happen . . .

Tractor accidents on Iowa roads are a problem for all Iowans—and also for motorists passing

through the state. An average of 281 tractor accidents each year occurred on our roads from 1949-59 (see chart).

How do these accidents happen? The types of accidents that occurred are shown in table 1. About 88 percent of all the accidents involving tractors were collisions with another vehicle. The same figure for Iowa accidents involving all types of vehicles was 78 percent for 1959.

Some of the safety devices and practices suggested may help avoid this.

Investigation of many of the accidents classified as "ran off roadway" and "other noncollision" has revealed that many of these resulted when the operator looked back to check the traffic. The tractor veered to the right, and, when the operator tried to correct it quickly, the tractor went off the roadway or even overturned on the roadway. Thus, it's clear that a major problem is to *alert* both the tractor operator and the operators of other motor vehicles to the presence of each other's vehicle while they're still a safe distance apart. (Tractor accidents on Iowa roads that are not connected with other traffic are likely less than 2 percent of the total.)

The largest percentage of the *fatal* tractor accidents were "ran off roadway" accidents (see table 1). This was true even though only 8 percent of all tractor accidents were of this type. While less than 2 percent of the "collision with other motor vehicle" accidents were fatal, 54.6 percent of the "ran off roadway," and 41 percent of the "other noncollision" accidents were fatal. But many of the last two types were "traffic involved." This again points up the need for the tractor operator to see behind and forward all the time.

Another important need is to alert automobile and truck drivers to the presence of a slow-moving vehicle ahead. Because of the differential in speed, the drivers need to be warned of slow-moving tractors from a greater distance than if the tractor were another car. *Accidents that happen when the tractor and other vehicle are going in the same direction account for over half of all accidents.* The speed differential between the tractor and the other vehicle was critical in 84 percent of all the tractor accidents studied.

Over half of the drivers involved in the tractor accidents were reported as violating some Iowa road law. The types of violations were different for the drivers of different types of vehicles (see table 2). Tractor operators' main mistakes were: didn't have the right-of-way, not under control, and no or improper signal. Car and other vehicle operators' main mistakes were: improper passing, not under control and following too closely.

Peak Accident Times:

The peak occurrence of tractor accidents on the public roads is in late morning (10-11 a.m.) and mid-afternoon (4-5 p.m.). Compared with the time of other types of accidents of farm people, the afternoon peak is about the same. The morning peak, however, is later—carrying on to noon with a relatively large percentage during the noon hour. This might be caused by traffic congestion on the road during the noon hour. The occurrence of tractor accidents drops off—especially after 7 p.m. —to practically nothing in the early morning hours. There is, however, an unaccountably large occurrence of tractor accidents between 11 and 12 p.m.

The number of accidents per month varies with the intensity of farming activity, especially when harvesting is involved. July and October are practically equal as the top accident months. Though the number of tractor accidents is low from December through March, travel on the roads may be more hazardous than during the other months when we consider the accidents on the basis of exposure.

The peak days for accidents are Tuesday and Saturday, though there really isn't a meaningful difference among the six workdays. Sunday is low in total occurrence, but this may also be high on an exposure basis when we consider the reduced number of tractors on the road on Sunday.

TABLE 1. Types of tractor accidents, and those which were fatal, on Iowa highways, 1949-59.

Type of accident	No. of accidents	No. of fatal accidents
Collision with other motor vehicles	2,704	50
Collision with a fixed object	27	5
Collision with pedestrians	6	2
Ran off roadway	262	143
Other noncollision	88	36
Total	3,087	236

TABLE 2. Six leading traffic violations related to accidents involving tractors on Iowa highways, 1949-59.

Type of violation	No. by tractor operators	No. by auto operators	No. by other operators (truck, etc.)
Didn't have right of way	443	105	30
Following too closely	21	219	53
Improper passing	25	328	113
No signal or improper signal	211	11	2
Not under control	271	253	67
Wrong side of road—not passing	99	74	22
Total	1,070	990	287

How Iowa Farmers Respond to Hog Cycles

This look at the yearly farrowing patterns among areas of Iowa and on 105 eastern Iowa farms may help in dealing with hog cycles. It also suggests some strategy you may want to consider in planning your yearly farrowings.

by Raymond R. Beneke, Donald R. Kaldor and James Herendeen

WHAT'S A GOOD guide for planning the number of sows to farrow each year? Trying to outguess the hog cycle is risky. You may be better off to decide how many sows you can handle most efficiently and then farrow about the same number each year.

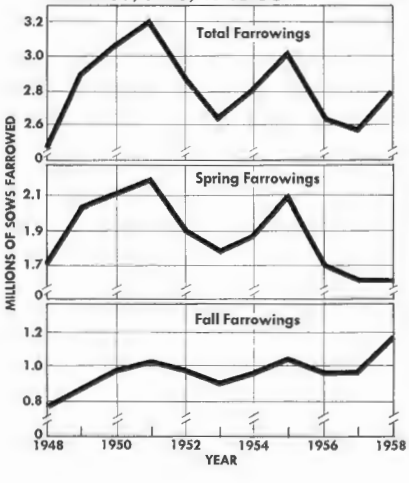
Of 105 eastern Iowa farm operators, about three-fourths shifted hog numbers in the wrong direction more than half the time.

One reason they moved the wrong way is that hog producers across the country tend to think alike. Other producers made the same production shifts as the Iowa producers. Moderate production changes on each farm snowballed to big changes nationally, which upset the expected trend.

In a previous article we discussed differences in year-to-year variations in sow farrowings among geographical areas in the United States. (See "States Share in Creating Hog Cycle" in the Nov.-Dec. 1960 issue of Iowa Farm Science or reprint FS-888.) We pointed out that Iowa, though not high among states in percentage variation, contributes greatly to the total variation in hog numbers. This is because Iowa produces so many hogs, and even a small percentage change means a large change in actual numbers of hogs produced.

Ups and downs of total farrowings on Iowa farms during 1948-58 show that spring farrowings vary more than fall farrowings (see chart 1). Following USDA reporting patterns, the spring pig crop includes December-May farrowings, and the fall crop includes June-November farrowings.

Chart 1. Changes in Number of Sows Farrowed, Iowa, 1948-58



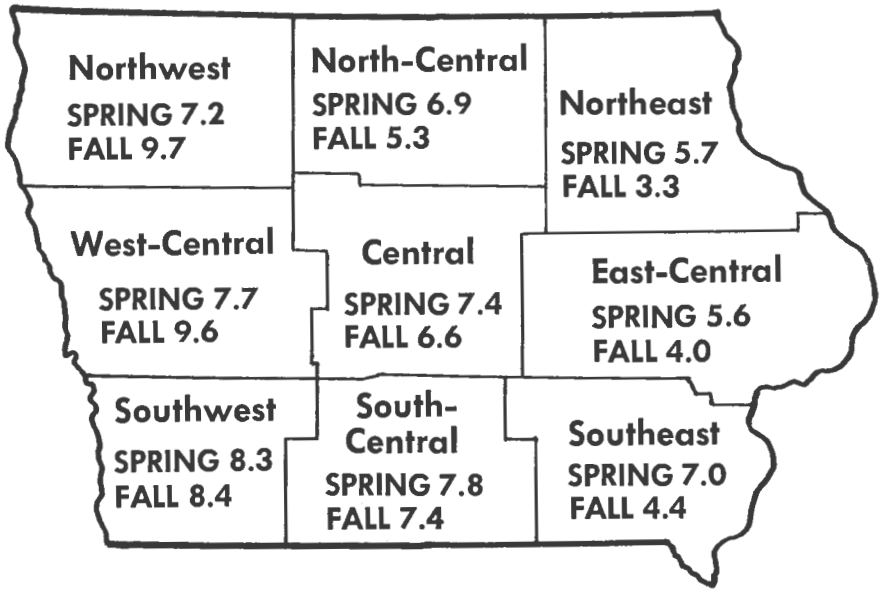
A shift from spring to fall farrowings is evident over the 10-year period. This shift likely grew out of the increased popularity of multiple-farrowing systems where pigs are farrowed at regular intervals three to six times during the year.

We recently completed a study of yearly farrowing patterns among Iowa areas and also among 105 eastern Iowa farm operators. The results may throw more light on hog cycles and how to cope with them. Let's look first at the area situation of the state and then at how the individual producers respond to the cycle.

Area Differences . . .

The map shows that fall farrowings in Iowa tend to be more

RAYMOND R. BENEKE and DONALD R. KALDOR are professors of agricultural economics. JAMES HERENDEEN formerly was a graduate student in agricultural economics.



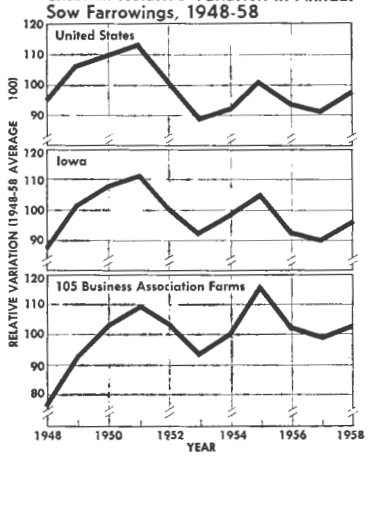
stable than spring farrowings except in the western third of the state. Differences among areas of the state, however, are greater for fall than for spring farrowings. East-central and northeast Iowa tend to have the most stable farrowing patterns for both spring and fall pig crops. Western and central Iowa tend to have the least stable patterns.

What accounts for these differences in farrowing patterns among the different areas? In general, the heaviest hog-producing areas also tend to have the least percentage variation in their production pattern. In addition, our studies of variations by counties show that year-to-year changes in feed-grain production affect farrowing changes. Corn yields vary more in western and southern Iowa, and this leads to greater instability in farrowings.

Ups and downs in farrowings wouldn't necessarily cut hog producers' incomes if the variations were of the right type. If Iowa hog producers, for example, decreased their production while other producers were expanding and vice versa, Iowa producers would have large numbers of hogs during years of favorable cost-price relationships and few hogs when returns were low.

It's evident, however, that the pattern of ups and downs in farrowings on Iowa farms closely follows the national pattern (see chart 2). Apparently Iowa hog producers as a group form ideas about future hog prices much like the producers throughout the country.

Chart 2. Relative Variation in Annual Sow Farrowings, 1948-58



Producers across the country respond together — expanding if they expect high prices; cutting back if they expect low prices. When so many producers react this way in the face of a fairly stable and inelastic demand for pork, the result is the large shifts in output and sharp price changes that characterize the hog cycle. Thus, prices often turn out to be greatly out of line with what producers expected when they made farrowing plans.

Farm Differences . . .

Carrying our analysis a step further, we looked at production patterns of 105 eastern Iowa farm operators who had a 10-year history of hog production records.

Farrowings varied greatly from year to year on most of the farms, but there were some differences among farms in the amount and the pattern of year-to-year changes. We found less percentage variation on farms with a high output of hogs than on farms where hogs are a small enterprise.

We also noted that producers who usually fed a large percent of the grain they raised or fed more than they raised tended toward higher farrowing variations than operators who fed a smaller part of the grain they produced. On farms where cattle feeding was an important enterprise, spring farrowings tended to vary more than where cattle feeding wasn't important.

We then studied differences between year-to-year variation in farrowings and the type of farrowing system used on the 105 farms. About 19 percent used a 1-litter system, 47 percent used a 2-litter system and 34 percent used a multiple-farrowing system. We saw little difference among these groups in year-to-year stability of farrowings.

Factors such as operator's age, years of farming experience and tenure arrangement had little effect in explaining the differences among the operators in the stability of the production pattern.

All operators were long-time members of a farm business association. As a group, they were above-average managers. Their contacts through the farm business associations gave them an opportunity to be better informed on price outlook than typical hog producers.

For these reasons, you might expect that the group wouldn't follow the crowd as closely in adjusting yearly farrowing plans. This isn't the case (see chart 2). The farrowing pattern of the 105 producers is much like the Iowa and national patterns, in terms of the ratio of annual farrowings to the average level of farrowings. The pattern for the whole group, however, consists of 105 individual patterns, with no two exactly alike.

We observed the number of

changes in sows farrowed during the expansion and contraction phases of the 1948-53 and 1954-57 cycles. During the years of expansion—1948, 1949, 1950, 1953 and 1954—an average of 60 percent of the group increased farrowings. About one-third decreased farrowings, and 7 percent made no change.

During the years of contraction—1951, 1952, 1955 and 1956—an average of 53 percent decreased farrowings, while 37 percent increased farrowings. The remaining 10 percent made no year-to-year change in farrowings.

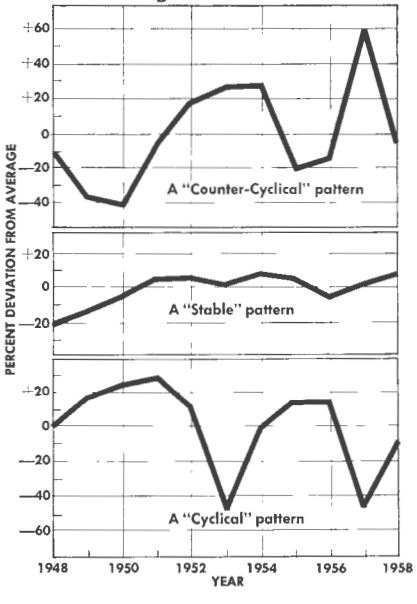
Close inspection of operators' individual patterns reveals that the over-all cycles resulted from a wide variety of patterns of change. Sequences involving increases dominated the expansion phase, and sequences involving decreases dominated the contraction phase.

Pattern Types . . .

There were at least four general types of patterns followed on the 105 farms: (1) counter-cyclical, (2) cyclical, (3) stable and (4) random. Farrowing patterns representing the first three types are shown in chart 3.

Each year, a *counter-cyclical* producer changed his production opposite to other hog producers. When hog numbers were increasing, he decreased his farrowings.

Chart 3. Three Farrowing Patterns Found Among 105 Eastern Iowa Farms



When other hog producers were cutting back, he expanded his numbers. None of the producers always moved counter-cyclically, though one operator changed 8 out of 10 times against the cycle and two shifted counter-cyclically 7 out of 10 times. Only eight farmers moved against the cycle more often than they moved with it.

The *cyclical* operators shifted farrowings right along with the cycle—increasing when most other operators were expanding and cutting back when others did so. Two operators followed the crowd each year. While only two operators exactly followed the over-all cycle, seven followed it 9 out of 10 years and 18 followed it 8 out of 10 years. Producers who moved with the cycle 6 or more times out of 10 were classed as cyclical operators. On this basis, 80 of the 105 fell into this category—the largest of the four groups.

No operator farrowed the same number of sows each year. Only four or five had enough stability in their farrowings to suggest that they were attempting to follow a *stable* pattern. Another three or four operators were gradually increasing or decreasing hog production during the period and had practically no "ups and downs."

The *random* classification is a "catch-all" group. It includes operators whose farrowing patterns didn't fit into any of the other groups. Their farrowings varied, often widely, but with no apparent relationship to the hog cycle or to changes in the corn-hog price ratio.

About four-fifths of the 105 operators shifted hog numbers from year to year in an attempt to adjust to changing price expectations. But 76 percent of the 105 changed in the wrong direction more than half the time. Stable operators didn't make such shifts. It's not clear to what factors the random group may have responded.

Best Strategy?

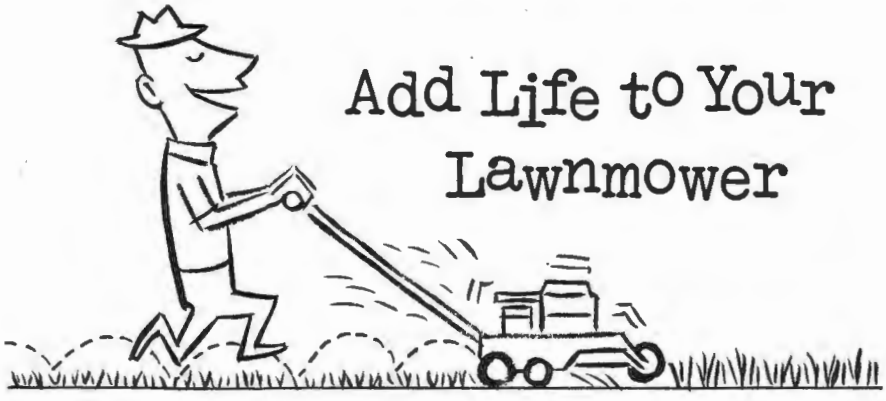
Let's now look at some possible strategy to follow in planning the number of sows to farrow each year. If, in a given year, you foresee that you won't cover variable costs that arise directly from producing hogs (such as feed and veterinary expenses), you might farrow no pigs, or just enough to provide gilts to "get back in." In addition to meeting these variable costs, you must allow for hired labor cost or a return for your own work. During any one year it's not essential to cover fixed costs to justify continuing to raise hogs, since these costs continue whether you raise hogs or not.

A second alternative would be to cut back on "extra litters" that are inconvenient and less efficient to handle with your existing facilities and labor supply. If some other enterprise looks attractive, you might expand it by using labor saved on hogs. Most of the 105 operators apparently attempted to follow the policy of cutting back rather than getting in and out. Only five or six producers seemed to follow an in-and-out system during the period studied.

A third strategy is to organize an efficient hog production program geared to your skills, facilities, labor availability and feed supply—and to try to farrow about the same number of sows each year. Such steady numbers should provide a cost advantage. Equipment would be fully used each year. But facilities wouldn't be periodically overcrowded, and you could give more consistent attention to breeding and management than on an "in-and-out" basis. Though you might not do as well as the successful counter-cyclical operator in terms of over-all profits, you'd probably do better following this stable pattern than most producers who follow the crowd.

If you count yourself among the few who are right most of the time in predicting which way hog numbers and prices will go, you may find a counter-cyclical operation the most profitable.

If you're among the majority—those who keep trying to shift, but often change in the wrong direction — you're likely to make more money over a period of years by adopting the third strategy—a stable farrowing pattern.



Add Life to Your Lawnmower

With a few inexpensive tools and by referring to the instruction manual, you can give your lawnmower the regular and systematic care and service it needs for safe, trouble-free service during the coming summer months.

by W. Forrest Bear

IT'S TIME to ready your lawnmower for another season. You can do many servicing and maintenance chores that will increase the life of your mower and its engine.

Major repair, engine overhaul and cleaning and adjusting the engine's contact points may best be left to a trained serviceman. But you can do other important jobs such as cleaning your mower, sharpening and balancing the cutter bar, cleaning and regapping spark plugs, changing oil, servicing the air cleaner, adjusting engine speed and cleaning the fuel tank and lines.

Proper tools for doing the work require only a small investment. You will need a spark plug wrench, a round wire spark plug gap gauge, a screwdriver, a small brush and some cleaning solvent.

The operating instructions that came with the lawnmower when new are your best guides for adjusting or replacing parts on the mower or the engine. The following kinds of regular and systematic service and maintenance will increase the life and usefulness of your mower and engine.

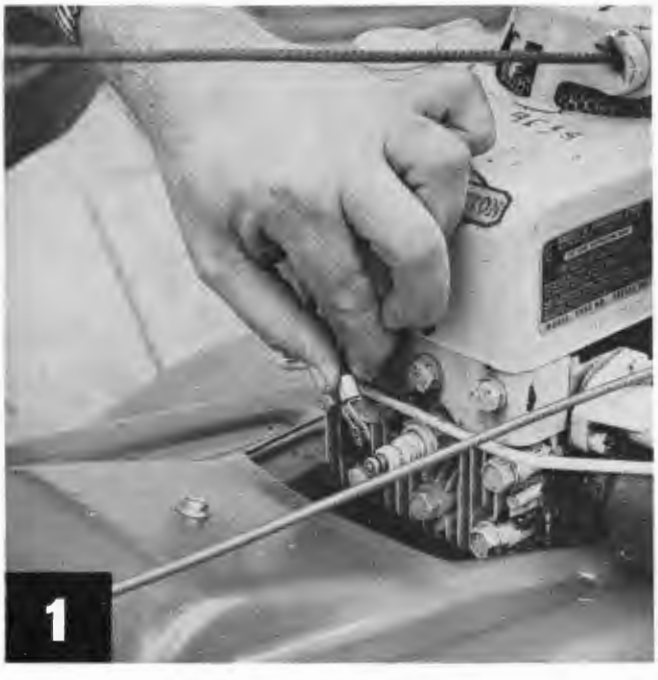
W. FORREST BEAR is instructor, Department of Agricultural Engineering.

Mower Care . . .

Always remove the spark plug wire, as shown in *photo 1,* before servicing your mower or its engine. Gasoline engines can start with only a short pull on the starter rope or by rotation of the cutter bar.

Most gasoline lawnmower engines are air cooled. If the engine isn't kept clean, clogged cooling fins may cause operating temperatures to rise. This reduces both life and efficiency of the engine. Remove old grease with a brush dipped in a safe, nonvolatile cleaning solvent (*photo 2*). Removing accumulation of dirt, grease, grass and leaves from the mower reduces the fire hazard. After this initial cleaning, the mower will be easier to keep clean. Let the engine cool after use, then wash it down with a garden hose. Wipe off daily oil accumulation with a cloth.

For safety and efficient cutting, be sure that the cutter bar is sharp and well balanced. An unbalanced cutter bar can ruin the engine or injure the operator. Check the balance of the sharpened bar by placing it on a narrow straightedge clamped in a vise (*photo 3*).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Since rough lawns and engine vibration loosen the machine's bolts, you may avoid some repair bills by periodically tightening all nuts and bolts.

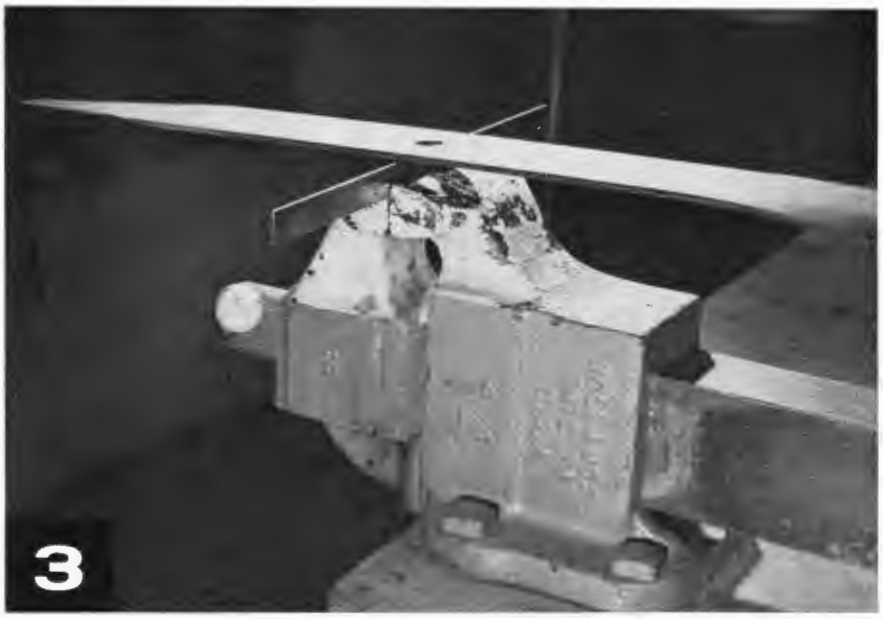
Engine Servicing . . .

Regap Plugs: Clean and regap spark plugs once each season or after the mower has operated 100 hours under normal conditions. To do this, remove the plug with a spark plug wrench (*photo 4*). Removing plugs with other tools may result in a broken plug. Use care to keep foreign matter from entering the cylinder when the plug is out or when you're removing or replacing it.

Find the correct spark plug gap setting as given in the operating instructions. Measure the correct spacing with a round wire spark plug gap gauge. Adjust the gap by bending the *side* electrode until it touches the gauge (*photo 5*). Don't try to bend the center electrode. Doing so may crack the insulator. Slip a new gasket over the plug before you replace it. The gasket acts as a sealer to prevent escape of the highly compressed fuel mixture from the cylinder head. Tighten the plug to the crushing point of the new gasket. All spark plugs aren't alike, so be sure to get the correct one if you buy a new plug.

Change Oil: Check the oil level in the crankcase of 4-cycle engines each time before using the engine. Change oil every 25 hours under normal operating conditions; more often under dusty conditions. Use the weight of oil specified in the instruction manual by the mower manufacturer.

Service Air Cleaner: Service the air cleaner after about every 25 hours of operation under normal conditions — more often under dusty conditions. Use a brush and cleaning solvent to remove dirt and sludge from the bottom of the cleaner (*photo 6*). Use air pressure or shake the top unit to remove any excess cleaning solvent.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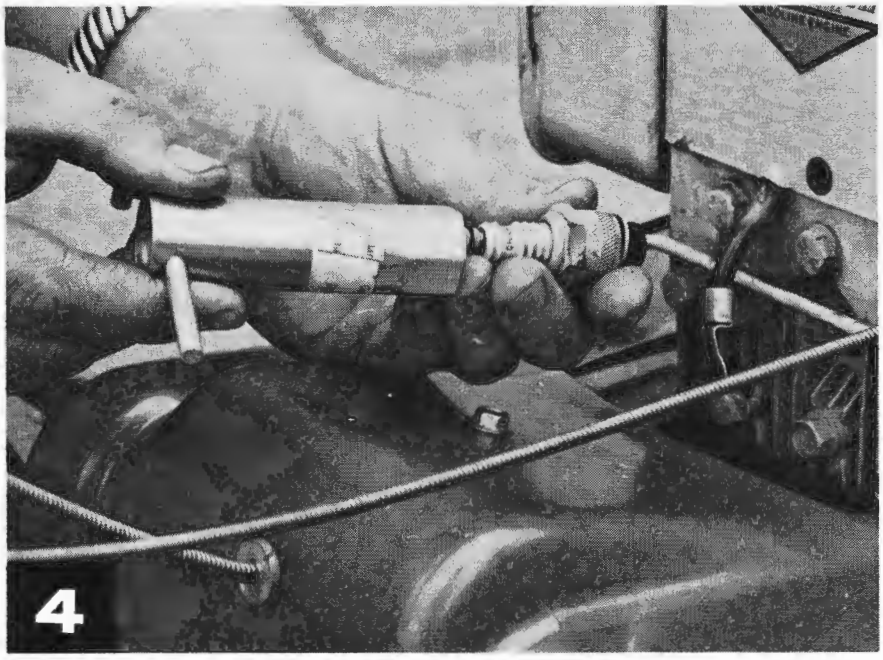
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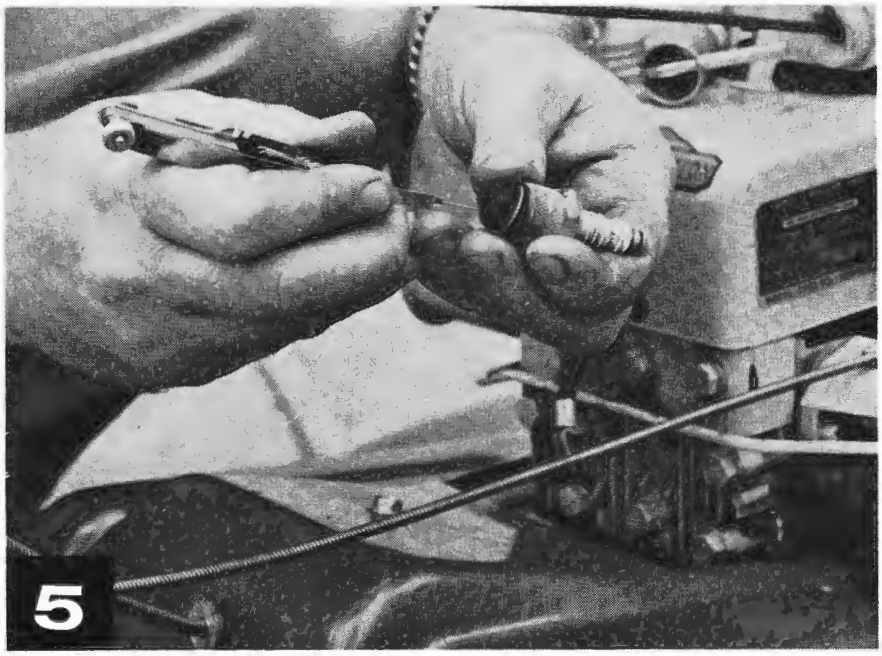
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If the cleaner is of the oil-bath type shown in the photo, add the recommended grade of oil to the "oil level" mark. Replace the gasket that holds the air cleaner cup, and re-assemble the air cleaner.

Adjust Engine: Carburetor and governor adjustments control the engine's speed. Use a screwdriver to adjust the carburetor and governor (*photo 7*), according to settings recommended in your instruction book. Incorrect idle speed adjustment of the governor causes the engine to die or to run fast. The engine will miss if the carburetor load adjustment is set for a too lean air-to-fuel mixture; it will race or run unevenly if the load is adjusted for a too rich air-to-fuel mixture.

Clean Fuel Tank: Drain the fuel tank, fuel line and carburetor bowl each season to flush out dirt or other foreign matter. Fill the tank with the exact fuel or fuel and oil mixture specified in the operating instructions. This is important because engines vary in the type of fuel they use. All 4-cycle engines use straight gasoline. Generally the 2-cycle engines use nondetergent oil mixed with gas. When filling the fuel tank use a container with a flexible nozzle and safety-button vent to prevent spillage (*photo 8*).

Remember These Points . . .

1. Always remove the spark plug wire before servicing your lawnmower.

2. Check oil level before using the engine.

3. Wipe off oil and grease after each use.

4. Change oil and service the air cleaner after 25 hours of normal operation.

5. Clean and regap plugs after 100 hours of normal operation.

6. Drain and flush fuel tank, fuel line and carburetor bowl each season.


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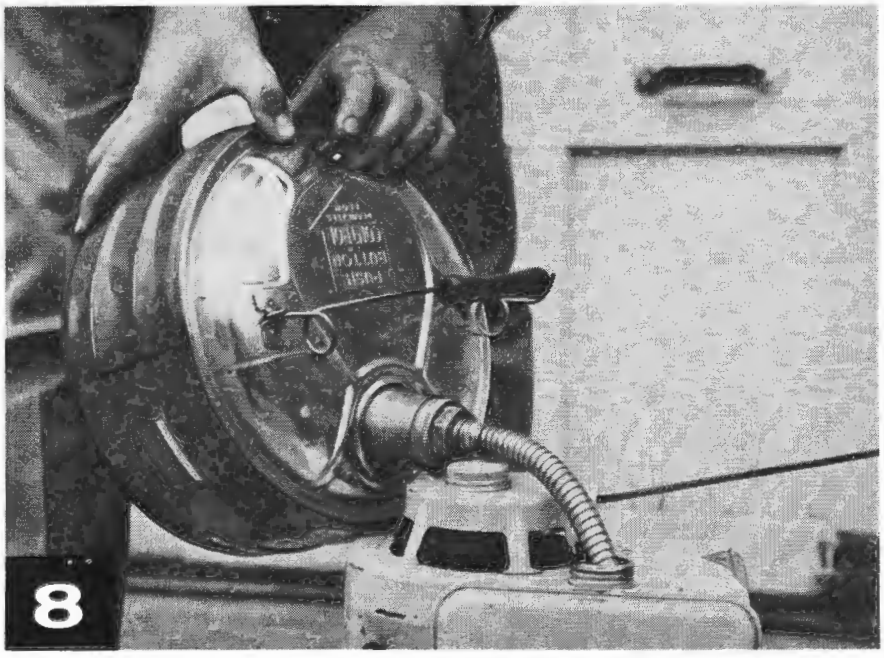
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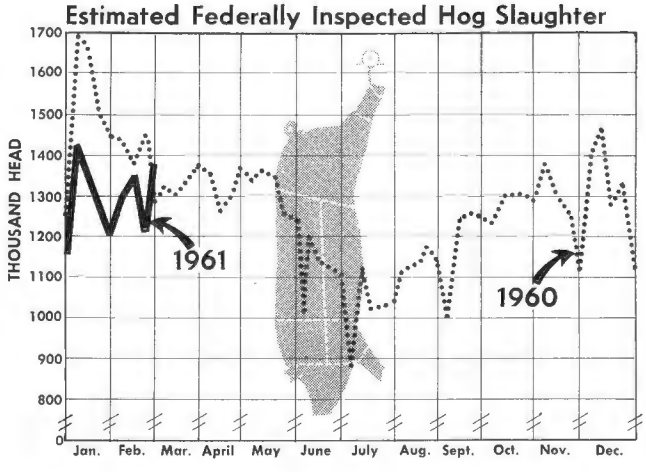
Farm Outlook...

HOG SLAUGHTER during March came close to the levels of a year ago. This was in direct contrast to January and February, when slaughter was well below comparable 1960 levels.

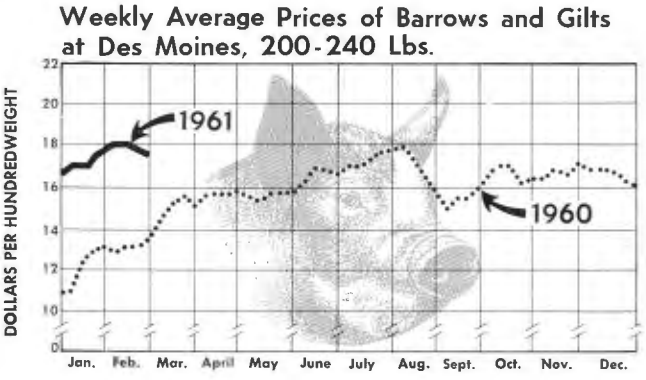
Producers in the 10 main Corn Belt hog growing states, on March 1, were planning to increase their 1961 spring farrowings by 8 percent over last year. Biggest percentage increases were being planned by western Corn Belt producers.

Early and late spring farrowings will be up if producers in these states follow through with their March 1 plans. Summer litters--June, July and August farrowings--will be up 5 percent.

These farrowing intentions indicate a moderate increase in pork production in 1961. Effects of the increase in production will show up in the fall market this year in two ways: (1) We are more likely to have a fall price decline, than to have prices in November and December about as high as in August. (2) Prices in November and December probably will be $1.50-$3 lower than last fall--depending on how strongly business conditions and employment have recovered by then and on how many gilts producers hold back to use for increased hog production in 1962.



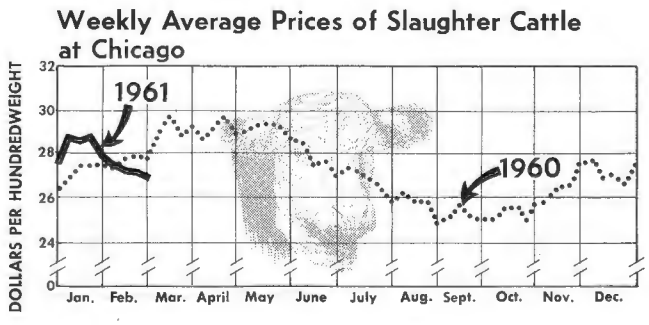
Meanwhile, remember that the summer hog price peak normally comes earlier in years of increasing production. Thus, we can expect the summer high point to come earlier this year than it did last year when it hit a peak around the first of August.



CATTLE . . .

Cattle slaughter began running ahead of year-ago levels in late January. This marked the beginning of the seasonal downturn in cattle prices. Last year, the downturn didn't begin until the second week in March. As the cattle prices chart shows, the market was steady to down a bit from then until mid-May.

Two forces were behind the earlier drop in cattle prices this year. (1) The market moved up earlier and so was operating from a higher base. Thus, when marketings began to exceed those



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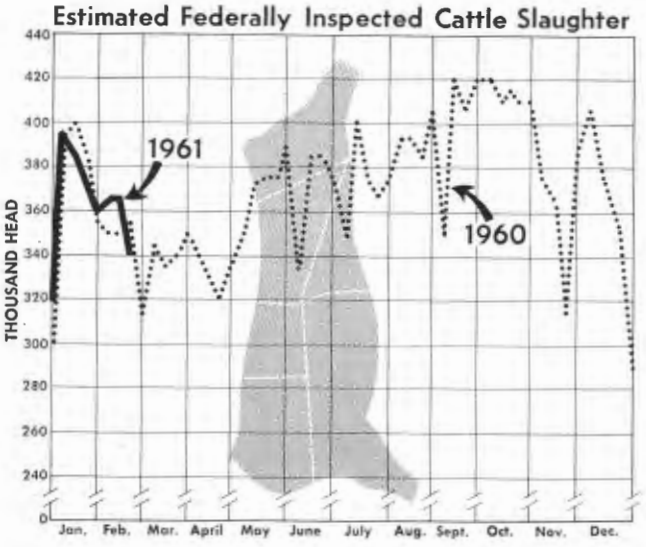

of last year, the market was in a more vulnerable position. (2) The business recession weakened the demand for beef. February's unemployment was the highest in 20 years, according to the United States Department of Labor.

Cattle slaughter is expected to stay high for the next few months, as the increased number of cattle on feed this year comes to market. By late summer, there may be some improvement in the cattle market, especially if the business situation looks better by then.

CROPS . . .

On March 1, the nation's farmers were planning to plant slightly fewer acres to corn in 1961 but about 9 percent more acres to soybeans than a year ago.

Since then, however, details of the USDA's 1961 feed-grain program have become known. As farmers study this program, they probably can count on free market prices for corn this fall to be around the level of last year's loan—or about 15 cents under the 1961 loan rate. The program, as it is being administered, probably will result in reduced corn production in 1961, fewer acres planted to oats and a sharp increase in soybeans. Loan levels very likely will determine the price of soybeans this fall.

EGGS . . .

If producers stick with their earlier plans to increase baby chick purchases by about 12 percent over last year, the outlook for egg prices this coming fall and winter is moderately less favorable than in the period just past.

Some increase in hatch can be handled because producers have culled large numbers of older hens that were carried over. But a 12-percent boost in hatch will be large enough to increase egg production. This will mean moderately lower egg prices for the coming fall and winter.

BUSINESS . . .

What's happening to the general economy is a critical point in the current farm outlook. The slow-down in business conditions, which has been greater than was expected last fall, has affected the demand for pork and beef.

The recession in 1958 bottomed out in April. Many business analysts have expressed a hesitant opinion that the present one will do the same. But if the economy doesn't turn up in the latter half of this year, then the outlook prospects for cattle and hog prices in late 1961 will have to be revised downward.

—Francis A. Kutish